Jpn. J. Ent., **62** (2): 333–340. June 25, 1994

Three *Dapsilarthra* Species (Hymenoptera, Braconidae) from Japan

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Abstract *Dapsilarthra* (*Heterolexis*) *okazakii* sp. nov. from agromyzid leaf-miners is described. *D.* (*Dapsilarthra*) *rufiventris* and *D.* (*H.*) *balteata* are newly recorded from Japan. A key to these three species, illustrations, hosts and habitat of each species, and supposed life-cycle of *okazakii* and *rufiventris* at Kyoto are given.

Key words: *Dapsilarthra*; Alysiinae; Agromyzidae; new species; Japan.

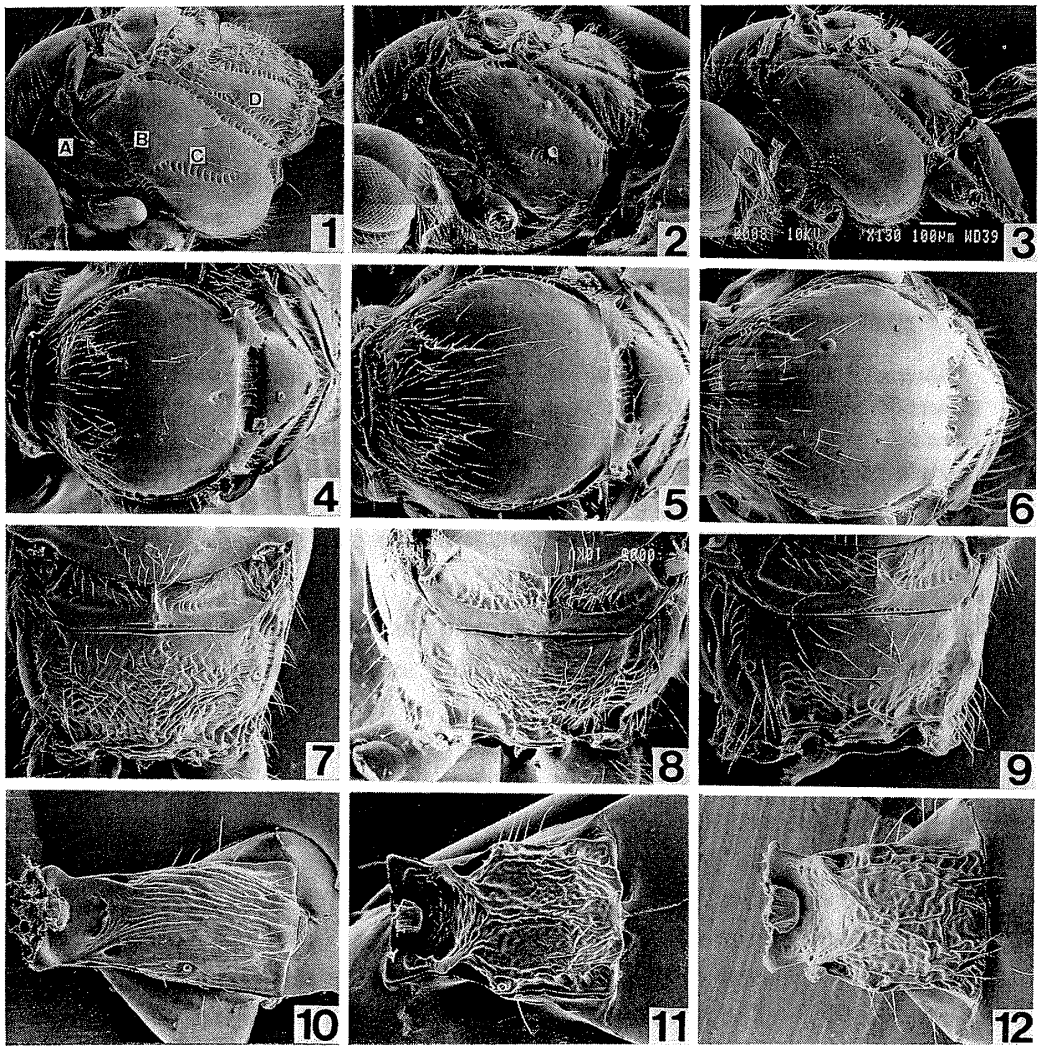
The genus *Dapsilarthra* is a small group of the Alysiinae, being represented by about some dozen species in the world. They are parasitoid on dipterous leaf-miners belonging to the families Agromyzidae, Anthomyiidae, Tephritidae, Psilidae and Scatophagidae (VAN ACHTERBERG, 1983). Recently, as most of the described species of this genus have been revised and keyed by VAN ACHTERBERG (1983), we have been able to identify the Japanese forms correctly. So far as we are aware no species of this genus has hitherto been recorded in Japan. In this paper we will give three Japanese species, including one new species, based on the specimens bred from agromyzid leaf-miners.

The terminology used in this paper is basically the same as that used by VAN ACHTERBERG (1983). The terms of the grooves on the pleura are explained in Fig. 1 Unless otherwise stated the specimens were collected and bred by the junior author. "em" is an abbreviation for emerged. The type of the new species is deposited in the collection of the Laboratory of Entomology, Kyoto Prefectural University.

Before going further, we wish to express our hearty thanks to Dr. M. SASAKAWA for identification of host agromyzids, and Mr. A. Iwasaki, Mr. H. TORIKURA and Dr. T. SUGIMOTO for gift of specimens.

Key to Japanese *Dapsilarthra* Species

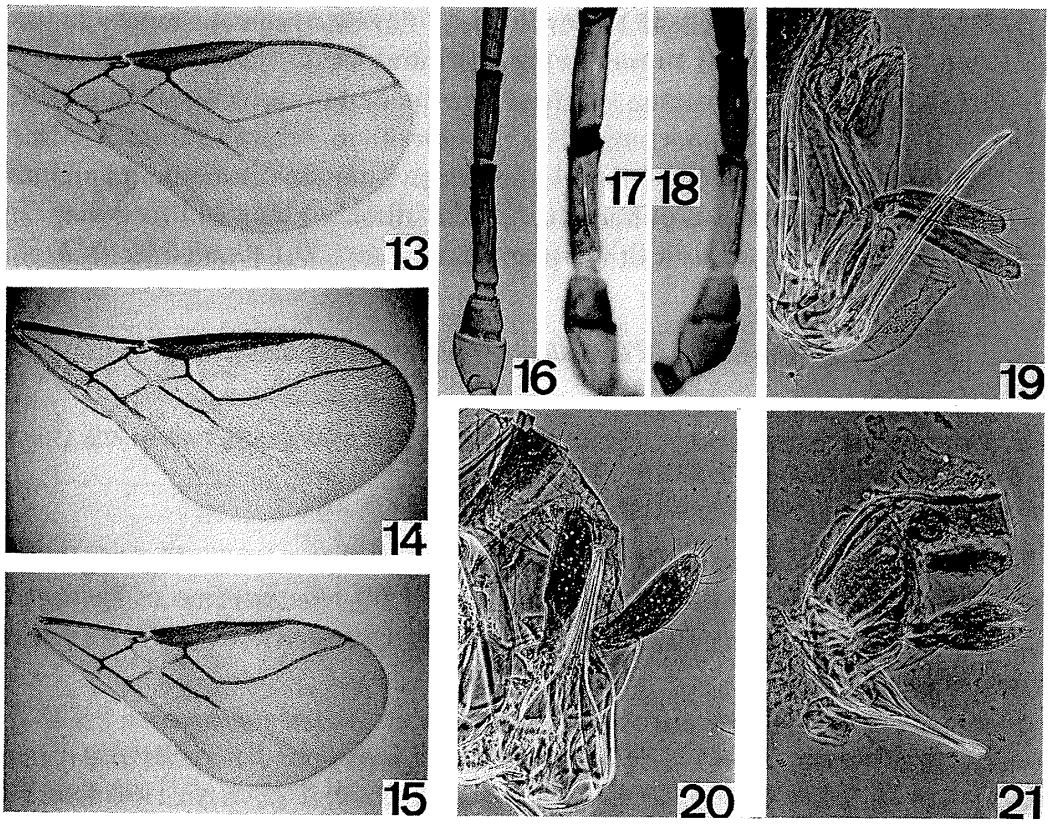
1. Fore wing (Fig. 13): vein CU1b present; vein CU1a situated below level of vein 2-CU1; vein m–cu antefurcal; pterostigma not reaching beyond middle of marginal cell; vein 3-SR 6–10 times as long as vein r, 2.1–2.6 times vein 2-SR. Petiole (Fig. 10) 1.6–1.9 times as long as wide at posterior end, its surface strigose. Medio-posterior groove of mesoscutum (Fig. 4) present. Thorax in lateral view (Fig. 1): pronotal furrow, mesopleural furrow, pre-



Figs. 1, 4, 7 & 10, *Dapsilarthra* (*Dapsilarthra*) *rufiventris*, ♀; 2, 5, 8 & 11, *D.* (*Heterolexis*) *balteata*, ♀; 3, 6, 9 & 12, *D.* (*H.*) *okazakii*, ♀ —— 1–3, thorax in lateral view; 4–6, mesoscutum & scutellum; 7–9, metanotum & propodeum; 10–12, petiole. A, pronotal furrow; B, mesopleural furrow; C, precoxal suture; D, metapleural furrow.

coxal suture and metapleural furrow distinct and crenulate. Female genitalia (Fig. 19): ovipositor slightly curved downwardly at apex; ovipositor sheath slender and long, nearly truncate at apex. Side of scutellum smooth. Temple in dorsal view converging just behind eye.

Antenna (Fig. 16) with 26–32 segments; 1st flagellar segment 1.1–1.3 times as long as the 2nd, 4.0–4.5 times as long as wide at base. Propodeum (Fig. 7) rugose on central surface. Mesoscutum (Fig. 4) moderately pubescent anteriorly; notaulix distinct and crenulate only on anterior surface. ..... *D.* (*Dapsilarthra*) *rufiventris*



Figs. 13, 16 & 19, *Dapsilarthra* (*Dapsilarthra*) *rufiventris*, ♀; 14, 17 & 20, *D.* (*Heterolexis*) *balteata*, ♀; 15, 18 & 21, *D.* (*H.*) *okazakii*, ♀ —— 13–15, fore wing; 16–18, antenna; 19–21, female genitalia.

— Fore wing (Figs. 14, 15): vein CU1b absent; vein CU1a situated at the same level as vein 2-CU1; vein m–cu interstitial; pterostigma reaching beyond middle of marginal cell; vein 3-SR 2.5–4.4 times as long as r, 0.8–1.2 times vein 2-SR. Petiole (Figs. 11, 12): 1.3–1.6 times as long as wide at posterior end, its surface rugose. Medio-posterior groove of mesoscutum (Figs. 5, 6) absent. Thorax in lateral view (Figs. 2, 3): pronotal furrow, mesopleural furrow and metapleural furrow smooth or only weakly crenulate; precoxal suture less developed than in *rufiventris*, smooth or crenulate. Female genitalia (Figs. 20–21): ovipositor straight on the whole length; ovipositor sheath widened medially, bluntly pointed at apex. Side of scutellum weakly rugose. Temple in dorsal view slightly diverging just behind eye. 2

2. Antenna (Fig. 17) with 39–45 segments; 1st flagellar segment shorter than the 2nd (0.94–0.97), 2.9–3.2 times as long as wide at base. Precoxal suture (Fig. 2) crenulate. Propodeum (Fig. 8) rugose on central surface. Mesoscutum (Fig. 5) densely pubescent anteriorly; notaulix distinct and crenulate, extending to dorsal surface. Vein r of fore wing (Fig. 14) 0.55–0.63 as long as width of pterostigma. ..... *D.* (*Heterolexis*) *balteata*

— Antenna (Fig. 18) with 26–33 segments; 1st flagellar segment longer than the 2nd (1.05–1.12), 3.3–4.1 times as long as wide at base. Precoxal suture (Fig. 3) usually smooth (in some specimens crenulate but not so distinct and wide as in *balteata*). Propodeum (Fig. 9) smooth on central surface. Mesoscutum (Fig. 6) scarcely pubescent anteriorly; notaulix distinct and crenulate only on anterior surface, effaced on dorsal surface. Vein r of fore wing (Fig. 15) 0.38–0.52 as long as width of pterostigma. ..... *D.* (*Heterolexis*) *okazakii*

Dapsilarthra* (*Dapsilarthra*) *rufiventris (NEES)

Bassus rufiventris NEES, (1812) 1814: 213.
Dapsilarthra rufiventris: KOENIGSMANN, 1959: 593–596; GRIFFITHS, 1966 a: 555, 1966 b: 782, 1968 a: 8–9 & 1984: 344; PAPP, 1991: 219.
Dapsilarthra (*Dapsilarthra*) *rufiventris*: VAN ACHTERBERG, 1983: 3, 11.

This species is characterized as mentioned in the above key. The specimens examined agree completely with KOENIGSMANN's (1959) redescription of *rufiventris* and the characterization of this species listed in GRIFFITHS' (1966 a) and VAN ACHTERBERG's (1983) keys.

Specimens examined: ex *Agromyza potentillae* on *Geum japonicum*: 5 ♀ 2 ♂, Kyoto, 29.x.1991 (em 7–16. iv. 1992); ex *A. sulfuriceps* on *Potentilla freyniana*: Kyoto, 3 ♀ 4 ♂, 25. x. & 17. xi. 1990 (em 3–12. iv. 1991), 1 ♂, 1. xi. 1990 (em 10. xii. 1990), & 2 ♀, 15. xi. 1991 (em 11–13. iv. 1992); ex *Chromatomyia horticola* on *Pisum sativum*: 1 ♂, Kyoto, v–vi. 1970, A. YOSHIDA leg.; ex *Liriomyza asterivora* on *Kalimeris yomena*: Kyoto, 1 ♀, 28. iv. 1978 (em 20. v. 1978), H. TAKADA leg., 1 ♂, 6. xii. 1990 (em 9. iv. 1991), 4 ♀, 19. iv. 1991 (em 17. v. 1991), 1 ♀, 20. iv. 1991 (em 3. x. 1991), 3 ♀, 27. iv. 1991 (em 21. v–10. vi. 1991), 2 ♀, 4. v. 1991, (em 27. v. & 10. x. 1991), & 3 ♂, 14. v. 1991 (2–9. vi & 8. x. 1991); ex *L. imurai* on *Kalimeris yomena*: 3 ♀, Kyoto, 29. x. 1991 (em 16–25. xii. 1991); ex *L. takakoae* on *Viola nipponica*: 1 ♀ 1 ♂, Kyoto, 1. xi. 1990 (em 10–12. xii. 1990); ex *Phytomyza araliae* on *Aralia elata*: 2 ♀ 3 ♂, Naganuma, Hokkaido, 28. vi. 1989 (em 18. vii. 1989), A. IWASAKI leg.; ex *P. japonica* on *Kalimeris yomena*: Kyoto, 1 ♀, 19. iv. 1991 (em 26. v. 1991), & 3 ♀, 27. iv & 7. v. 1991 (em 18–19. x. 1991); ex *P. oenanthes* on *Oenanthe javanica* var. *japonica*: 1 ♀, Naganuma, Hokkaido, 2. vii. 1989 (em 17. vii. 1989), A. IWASAKI leg.; ex *P. polycladae* on *Sanicula* sp.; 1 ♀, Naganuma, Hokkaido, 4. vii. 1987 (em 22. vii. 1987), A. IWASAKI leg.; ex *P. ranunculi* on *Ranunculus glaber*: 7 ♀, Kobe, T. SUGIMOTO leg.; ex *Phytomyza* sp. on *Artemisia vulgaris*: 1 ♀, Kyoto, 8. xi. 1990 (em 7. iv. 1991); 1 ♀ 2 ♂, Kyoto, 18 & 24. v, & 8. vi. 1991; Agromyzid sp. on *Saxiflaga* sp.: Kyoto, 1 ♂, 7.x. 1991 (em 31. x. 1991), & 1 ♂, 3. xi. 1991.

Hosts: *Agromyza potentillae* (KALTENBACH), *A. sulfuriceps* STROBL, *Chromatomyia horticola* (GOUREAU), *Liriomyza asterivora* SASAKAWA, *L. imurai* SASAKAWA, *L. takakoae* SASAKAWA, *Phytomyza araliae* SASAKAWA, *P. japonica* SASAKAWA, *P.*

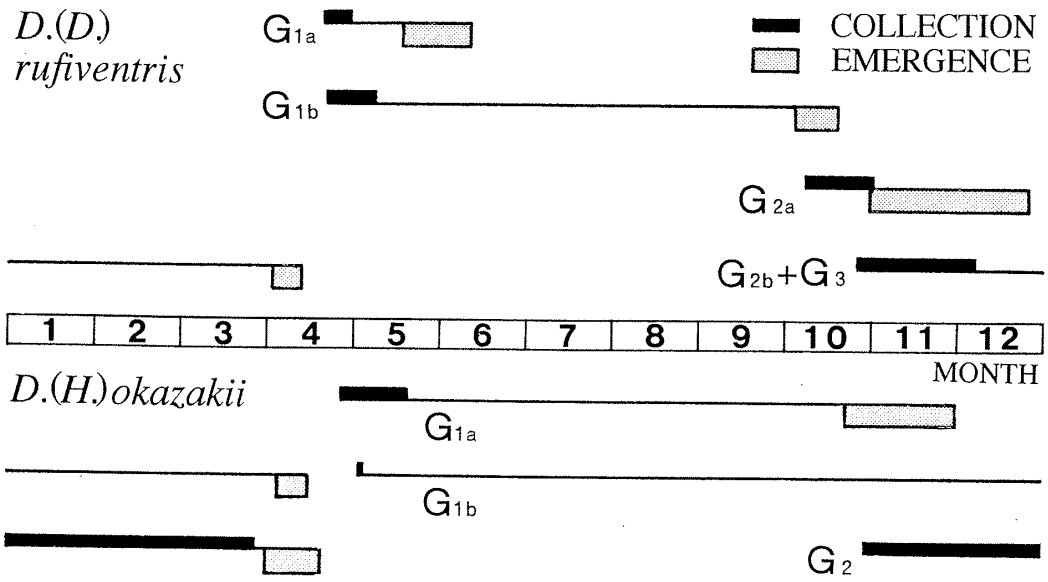


Fig. 22. Relation between date of collection of host larvae and/or puparia and date of adult emergence of *Dapsilarthra* (*Dapsilarthra*) *rufiventris* and *D.* (*Heterolexis*) *okazakii* at Kyoto (based on the collecting and breeding data, see "*specimens examined*" in the text). The survey for parasitoids of Agromyzidae was carried out at Kyoto by the junior author periodically through the years 1990–1992. Agromyzid larvae and puparia collected were kept in an outdoor insectary in the Experimental Farm of Kyoto Prefectural University (Shimogamo, Kyoto) and emergence of the fly and parasitoids were checked everyday.

oenanthes SASAKAWA, *P. polycladae* SASAKAWA, *P. ranunculi* SCHRANK, *Phytomyza* sp. on *Artemisia vulgaris*, agromyzid sp. on *Saxiflaga* sp.

Many species belonging to various genera of Agromyzidae have been recorded as hosts of *D.* (*D.*) *rufiventris* (KOENIGSMANN, 1959; GRIFFITHS, 1966 b, 1968 a and 1984). However, *Agromyza* species are confirmed as its hosts for the first time.

Habitat: Open field to open edge of forest.

Distribution: Japan (Hokkaido, Honshu); Mongolia; Europe. New to Japan.

Life-cycle: From the breeding data (Fig. 22), the life-cycls of *D.* (*D.*) *rufiventris* at Kyoto is supposed as follows:– The adults of the overwintered generation (G_{2b}+G_3) appeared on April 3–13. A portion of individuals of the first generation (G_{1a}) completed their cycle quickly and emerged on May 17–June 10. The remainder (G_{1b}) passed the summer in dormant condition and emerged on October 3–18. A portion of the brood of the second generation (G_{2a}) emerged on November 1–December 25. The remainder (G_{2b}) passed the winter in dormant condition together with the individuals of the third generation (G_3). Thus *D.* (*D.*) *rufiventris* certainly has up to 3 generations per year. This species may have one more generation in spring though no evidence was obtained of it during the present study.

Dapsilarthra (*Heterolexis*) *balteata* (THOMSON)

Alysia (*Adelura*) *balteata* THOMSON, 1895: 2288.
Dapsilarthra balteata: KOENIGSMANN, 1959: 585–587; GRIFFITHS, 1966 a: 555–556, 1966 b: 783, 1968 a: 8–9, 1968 b: 65 & 1984: 343–344.
Dapsilarthra (*Heterolexis*) *balteata*: VAN ACHTERBERG, 1983: 2, 8.

This species is characterized as mentioned in the above key. The specimens examined agree well with KOENIGSMANN's (1959) redescription of *balteata* and the characterization of this species listed in GRIFFITHS' (1966 a and 1968 a) and VAN ACHTERBERG's (1983) keys. The only difference with KOENIGSMANN's redescription is the slightly shorter first flagellar segment than the second (longer in his description).

Specimens examined: ex *Agromyza albipennis* on *Hordeum vulgare*: 2 ♀ 3 ♂, Kunneppu, Hokkaido, 6. x. 1980, H. TORIKURA leg.; ex *A. nigrescens japonica* on *Geranium nepalense* var. *thunbergii*: 1 ♀, Nopporo, Hokkaido, 20. vi. 1987 (em 23. ix. 1987), & 1 ♀ 1 ♂, Kunimiyama, Otofuke, Hokkaido, 2. vii. 1988, A. IWASAKI leg.; ex *A. pseudoreptans* on *Urtica platyphylla*: 2 ♀ 3 ♂, Naganuma, Hokkaido, 3. x. 1990 (em 27. iv–1. v. 1991), A. IWASAKI leg.

Hosts: *Agromyza albipennis* MEIGEN, *A. nigrescens japonica* TSUJITA, *A. pseudoreptans* NOWAKOWSKI.

This species has a wide host range (KOENIGSMANN, 1959; GRIFFITHS, 1966 a, 1968 a, 1968 b and 1984), but its main hosts are supposed to be the larger *Agromyza* species (GRIFFITHS, 1984).

Habitat: Open field to open edge of forest.

Distribution: Japan (Hokkaido); Europe. New to Japan.

Dapsilarthra (*Heterolexis*) *okazakii* sp. nov.

Description: Female and male. Body 1.6–2.2 mm, antenna 2.5–3.6 mm in length. Temple in dorsal view slightly diverging just behind eye, 0.70–0.95 as long as eye; face 1/1.8–2.2 as wide as head. Antenna (Fig. 15) with 26–33 segments (♀: 3/26, 2/27, 3/28, 15/29, 9/30, 6/31, 1/32, 1/33; ♂: 7/29, 7/30, 6/31, 3/32); 1st flagellar segment 1.05–1.12 times as long as the 2nd, 3.3–4.1 times as long as wide at base. Mesoscutum (Fig. 6) smooth and shining, scarcely pubescent on anterior surface and scatteringly hairy along notaulix; notaulix distinct and crenulate only on anterior surface and effaced on dorsal surface; medio-posterior groove absent. Scutellum (Fig. 6) smooth, its sides weakly rugose, with scutellar sulcus deep and finely crenulate. Mesepisternum (Fig. 3) with precoxal suture usually smooth, in some specimens weakly crenulate. Propodeum (Fig. 9) smooth on central surface and moderately hairy. Petiole (Fig. 12) 1.5–1.6 times as long as wide at posterior end, its surface coarsely rugose. Genitalia (Fig. 21): ovipositor straight on the whole length; ovipositor sheath widened medially and bluntly point at apex, with 19 long hairs and 7 sensilla (n=1). Fore wing (Fig. 15): vein CU1b absent; vein CU1a

at the same level as vein 2-CU1; vein m–cu interstitial; pterostigma reaching beyond middle of marginal cell; vein r shorter than width of pterostigma (0.38–0.52); vein 3-SR 2.8–4.4 times as long as r, 0.8–1.2 times 2-SR.

Head black; clypeus occasionally brown; mandible (except for dark edge), labrum and palpi yellowish-brown. Antenna chestnut-brown; first 3 segments usually yellowish-brown ventrally, in some specimens both 2nd and 3rd segments entirely dark brown. Therax entirely black. Abdomen chestnut-brown; petiole dark brown, brown or yellowish-brown; tergite (2+3) yellowish-brown to yellow, entirely or only medially. Legs dull yellow; hind tibia and tarsus darker. Fore and hind wings hyaline; pterostigma and veins brown, darker in male than in female.

Remarks: In general appearance this species is similar to *D.* (*Heterolexis*) *balteata*, from which it can be distinguished by the above-mentioned key. This species also resembles *D.* (*Heterolexis*) *levisulca* GRIFFITHS in the smooth precoxal suture, the feebly impressed notaulix and the less sculptured propodeum, but it differs in the eye not convergent below: minimum distance between eyes about 1/2, not about 2/5 as in *levisulca* (GRIFFITHS, 1968 a). This species has wide range of variation in the body colour as described above. In some specimens the petiole is yellowish-brown. In this characteristic this species is common with *D.* (*Heterolexis*) *subtilis* (FOERSTER), but it differs in the precoxal suture not sculptured as in *subtilis* (VAN ACHTERBERG, 1983).

Specimens examined: holotype (♀) and paratype 1 ♂: ex *Napomyza yasumatsui* on *Clematis paniculata*, Kyoto (Shizuhara), 2. v. 1991 (em holotype: 24. x. 1991; paratype: 5. xi. 1991). Paratypes: ex *Agromyza potentillae* on *Rosa multiflora*: 5 ♀ 1 ♂: Kyoto, 15. i. 1991 (em 8–16. iv. 1991); ex *Chromatomyia suikazurae* on *Lonicera japonica*: 4 ♀ 3 ♂, Matsudo, 15–23. v. 1982, K. OKAZAKI leg.; Kyoto, 2 ♀ 3 ♂, 20–30. xii. 1990 (em 2–7. iv. 1991), 2 ♀ 1 ♂, 14–27. iii. 1991 (em 11–13. iv. 1991), 3 ♂, 26. iv. 1991 (em 19–20. x.1991), & 3 ♀ 5 ♂, 27. ii. 1992 (em 2–17. iv. 1992); ex *Phytomyza arnaudi* on *Osmorhiza aristata*: 1 ♀ 2 ♂, Kyoto, 18. v. 1991 (em 10–18. xi. 1991); ex *P. eupatorii* on *Eupatorium japonicum*: Kyoto, 1 ♂, 20. xi. 1990 (em 29. iii. 1991), & 10 ♀ 2 ♂, 28. x–25. xi. 1991 (em 3–9. iv. 1992); ex *P. kisakai* on *Styrax japonica*: 11 ♀, Kyoto, 3–12. v. 1991 (em 7–14. xi. 1991 & 4–15. iv. 1992); ex agromyzid sp. on *Sambucus sieboldiana*: 1 ♀ 1 ♂, Kyoto, 21. x. 1984, H. TAKADA leg.

Hosts: *Agromyza potentillae* (KALTENBACH), *Chromatomyia suikazurae* SASAKAWA, *Napomyza yasumatsui* SASAKAWA, *Phytomyza arnaudi* SASAKAWA, *P. eupatorii* HENDEL, *P. kisakai* SASAKAWA, agromyzid sp. on *Sambucus sieboldiana*.

Habitat: Forest.

Distribution: Japan (Honshu).

Life-cycle: From the breeding data (Fig. 22), the life-cycle of *D.* (*H*). *okazakii* at Kyoto is supposed as follows:– The adults of the overwintered generation (G_{1b}+G_2) appeared on March 29–April 19. The majority of individuals of the first generation (G_{1a}) passed the summer in dormant condition and emerged on October 19–

November 29. A portion of the brood (G_{1b}) underwent prolonged period of dormancy and the adults appeared in the following spring. The individuals of the second generation (G_2) passed the winter in dormant condition. The collecting period of them was long from October 28–March 27, since larvae of *Agromyza potentillae* which developed slowly during winter and pupae of *Chromatomyia suikazurae* which pupated within the leaves of an evergreen plant *Lonicera japonica* were collected periodically during the winter. However, the oviposition period of their parent is possibly within the previous year. Thus this species goes through usually two generations and occasionally one generation each year.

This species is named in memory of the late Dr. Katsutaro OKAZAKI who offered us valuable specimens.

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(Received December 31, 1993; Accepted February 22, 1994)